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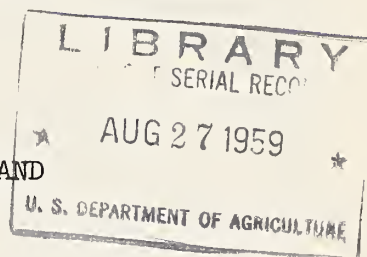
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A LISTER PLANTER ATTACHMENT FOR SIDE-BAND
PLACEMENT OF STARTER FERTILIZER^{1/}

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Numerous experiments have shown listing to be a desirable tillage method for the production of corn.^{3/} It is efficient from a labor standpoint, and when used on the contour is an excellent soil and water conservation measure. In the Great Plains region, where rainfall is often the limiting factor, corn yields from listing have been equal to or better than yields from conventional planting methods. Listed corn, however, is slow in starting. The young plants are yellow and grow slowly for some time after emergence. Stands of listed corn are often poorer than those obtained with other methods, sometimes resulting in lowered yields.

While it is realized that fertilizer is not the whole answer to this problem, it does seem likely that properly placed starter fertilizer can do much to improve the emergence and early-season growth of listed corn.

^{1/} Joint contribution from the Iowa Agricultural Experiment Station, Ames, Iowa, and the Agricultural Engineering Research Division, Agricultural Research Service, U. S. Dept. of Agr. Journal paper No. J-3597 of the Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa. Project No. 787.

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^{3/} Larson, W. E., Shaller, F. W., Lovely, W. G., and Buchele, W. F. New Ways to Prepare Corn Ground. Iowa Farm Science 10 (10): pp. 3-6. 1956.

When applied with most existing equipment, starter fertilizer is merely dropped in the lister furrow or at best placed in a shallow band close to the seed. Conventional planting methods have shown that maximum use of fertilizer by the corn plant occurs when the fertilizer is applied in a band 1 to 2 inches to one side of the seed and about 2 inches lower than the seed.^{4/} Two reasons are given for the improved response obtained with side-band placement of fertilizer. It enables plants to make more use of fertilizer phosphorus by retarding fixation loss, and it prevents poor stands caused by too much nitrogen coming in contact with the seed.

Figure 1 shows a commercial 2-row lister planter that was modified at Ames in 1957 to place starter fertilizer 2 inches to the side of and 2 inches lower than the seed. It was a conventional hard-ground lister equipped with disk moldboards. On the original machine the fertilizer was dropped at the bottom of the lister furrow about 2 inches to the side of where the seed was planted. This amounted to placing the fertilizer on the surface of the ground 1 to 2 inches higher than the seed.

In order to provide a means for band application, a short runner-type subsoiler of the same type as that used for the seed furrow opener was mounted below and to the rear of the lister point. The fertilizer opener was placed 9 inches ahead of the seed opener and 2 inches to the side. It was bolted to a bracket welded to the lister frame. As shown in figure 2, the fertilizer furrow opener was placed beneath the rear portion of the lister share. The normal depth of planting adjustment as furnished by the manufacturer was retained unchanged and the depth adjustment for the fertilizer was made to correspond with it.

The procedure involved in the modification was as follows:

1. The disk-moldboards, planter units, and disk-coverers were removed in order to provide access to the lister frame.

2. A bracket $7\frac{1}{2}$ inches long was cut from $2\frac{1}{2}$ by $3/4$ -inch hot rolled steel. The bracket was welded to the lister frame as shown in figure 3. The upper corner of the bracket was removed in order to provide clearance for the lister shin. The parts were aligned prior to

^{4/} Olsen, R. A., and Dreier, A. F. Best Use of Phosphorus Depends on Where You Place It. What's New in Crops and Soils 9 (8): 14-16. 1957.

Mederski, H. J. Corn Yield Depends Upon Placement of Fertilizer. Ohio Farm and Home Research 42 (305): 28. 1957.

welding by placing them in their proper relative positions on a level concrete floor. Since the surface of the lister frame to which the bracket was attached was not parallel with the inner surface of the bracket, it was necessary to place a $\frac{1}{4}$ -inch-square spacer between the forward edge of the bracket and the lister frame. This is shown in figure 3.

3. Thin-walled steel tubing of $1\frac{1}{2}$ -inch outside diameter was used for the fertilizer tube. The tube was flattened at the lower end so that it would fit between the wings of the furrow opener. It was also necessary to flatten the tube slightly near the upper end so that it would lie close to the lister frame. The standard clamp furnished with the furrow opener was used to hold the lower end of the tube in place. A clamp for the upper end was constructed from 1 by $1/8$ -inch steel strap. It would also be possible to weld the tube to the lister frame at its upper end instead of using a clamp.

4. The disk-moldboards were moved outboard slightly in order to provide sufficient clearance for the fertilizer tube. A 2-inch-square spacer was cut from $5/16$ -inch-thick steel plate. An oblong hole of the same shape as the shoulder on the disk shaft was cut in the center of each spacer. The spacers were then welded over the shaft holes in the lister frame as shown in figure 2. This provided an additional $5/16$ -inch of clearance between each disk-moldboard and the lister frame.

The construction details of the modification of this particular lister are shown in figure 3. They are of course applicable to only this one make and model of machine. However, they do show the procedure followed. Similar modifications can be made on other makes of lister planters.

Preliminary field tests of an earlier design indicated the necessity of keeping the unit short. When the seed unit was moved 12 inches rearward, considerable difficulty was experienced in following contour furrows. In the present design the overall length of the machine was not changed. This enabled the modified lister planter to negotiate the turns found in contour planting.

Field tests have shown that the modified lister planter will satisfactorily band-place fertilizer 2 inches to the side and 2 inches lower than the seed (figure 4). The first machine of this type was used in experimental work in Iowa in 1957. A very satisfactory response of listed corn to starter fertilizer applied in this manner was noted. In 1958 three modified listers were used on experimental farms in Iowa. One was used in an area where listing is an accepted practice among farmers. The performance of these machines has been satisfactory, although some increase in draft force was noted.

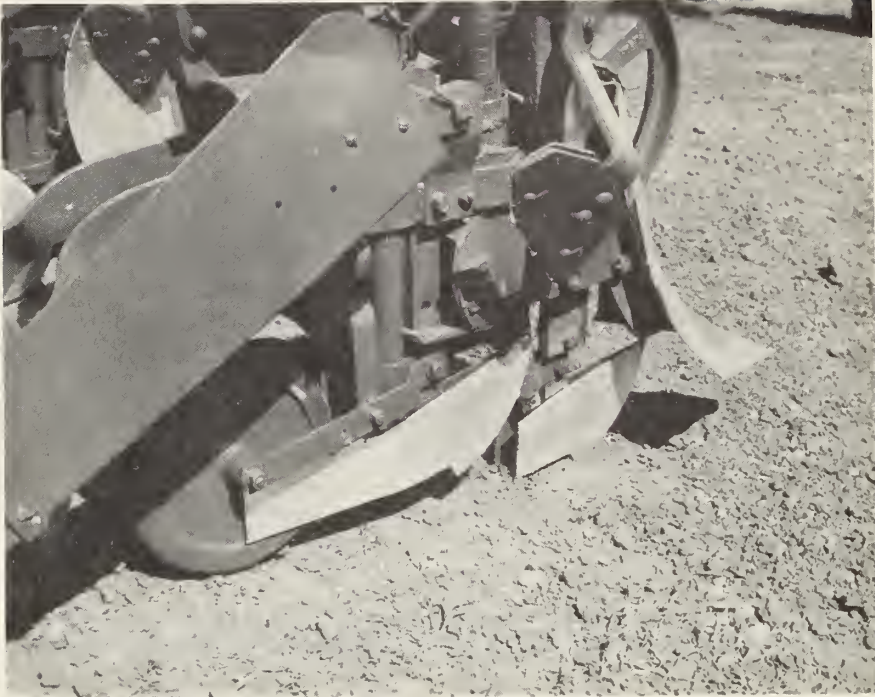
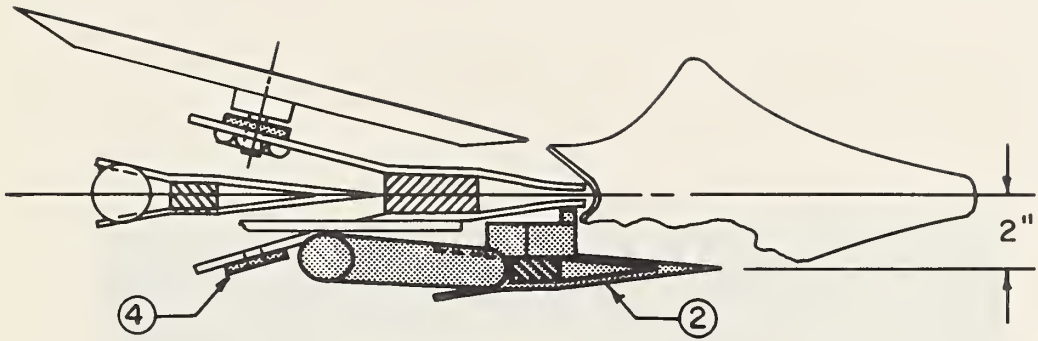


Figure 1. Modified lister planter.



Figure 2. Location of furrow openers.



PARTS ADDED

- ① BRACKET - $\frac{3}{4}$ " x $2\frac{1}{2}$ " x $7\frac{1}{2}$ "
- ② FERTILIZER OPENER
- ③ FERTILIZER TUBE - $1\frac{1}{2}$ " O.D. x $16\frac{1}{2}$ "
- ④ SPACERS - $\frac{5}{16}$ " THICK
- ⑤ TUBE CLAMP

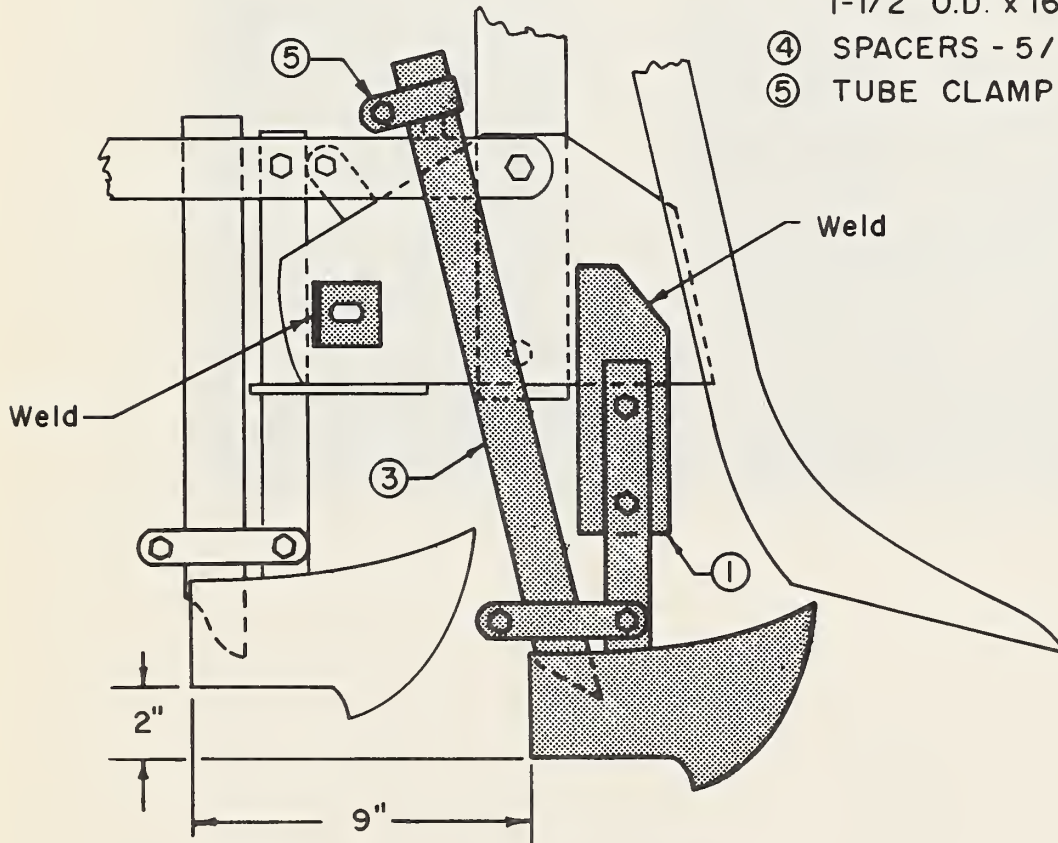


Figure 3. Lister planter modification

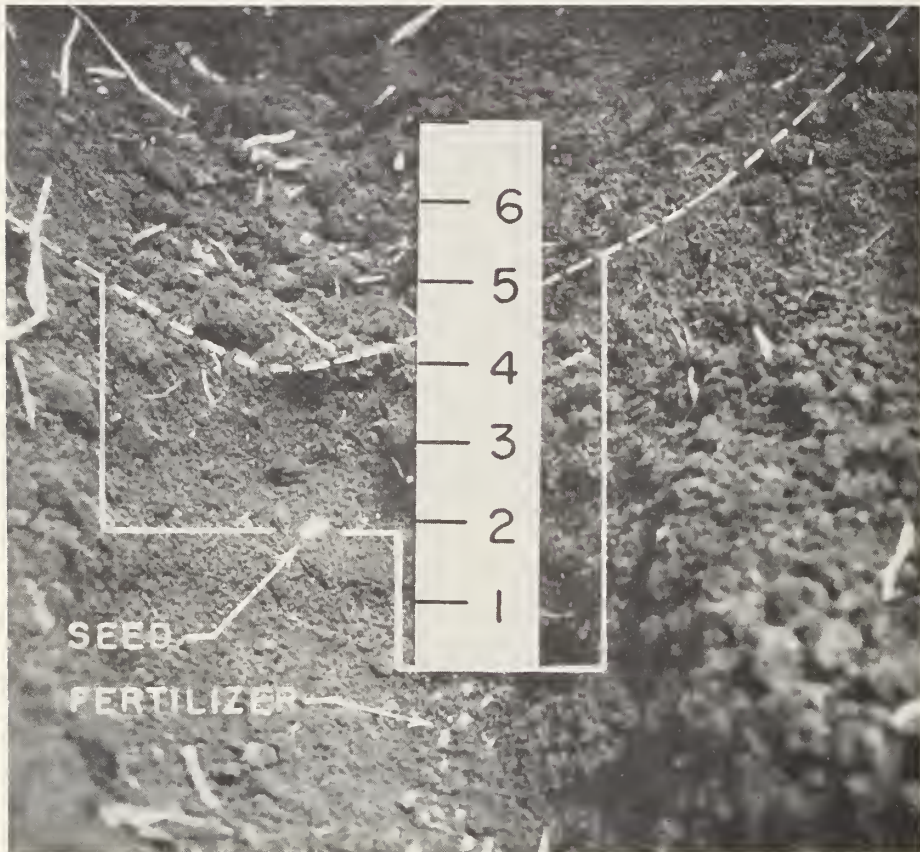


Figure 4. Placement of seed and fertilizer in the lister furrow.

